What is claimed is:

1. A method for integrating a polynucleotide comprising:

providing a fish cell comprising a target polynucleotide, wherein the fish cell will become a germ cell when introduced to a fish embryo;

introducing to the fish cell a modifying polynucleotide comprising a first homologous region and a second homologous region, wherein the first homologous region will undergo homologous recombination with a first region of the target polynucleotide, and wherein the second homologous region will undergo homologous recombination with a second region of the target polynucleotide, and

identifying a recipient fish cell comprising the modifying polynucleotide integrated in the target polynucleotide.

2. The method of claim 1 wherein the frequency of integration of the modifying polynucleotide in the target polynucleotide is at least about 1 cell in about 400 cells that contain the modifying polynucleotide.

3. The method of claim 1 wherein the fish cell is a zebrafish cell.

4. The method of claim 1 wherein identifying comprises nucleotide sequence analysis of the modifying polynucleotide, hybridization of nucleotide sequences present in the modifying polynucleotide, nucleotide amplification of nucleotide sequences present in the modifying polynucleotide, or a combination thereof.

5. The method of claim 1 wherein the modifying polynucleotide further comprises a vector.

6. The method of claim 1 further comprising evaluating the phenotype of the recipient fish cell comprising the modifying polynucleotide integrated in the target polynucleotide.

7. The method of claim 1 wherein the modifying polynucleotide further comprises a coding sequence located between the first homologous region and the second homologous region, wherein the coding sequence encodes a marker.

8. The method of claim 1 wherein the modifying polynucleotide comprises a first coding sequence located between the first homologous region and the second homologous region, the first coding sequence encoding a selectable marker, wherein the modifying polynucleotide further comprises a second coding sequence located 5' of the first coding sequence or 3' of the second coding sequence, the second coding sequence encoding a detectable marker, and wherein identifying comprises identifying a cell expressing the selection marker and not expressing the detectable marker.

9. The method of claim 1 wherein the first homologous region and the second homologous region are each at least about 2000 nucleotides in length.

10. A cell obtained by the method of claim 1.

11. A method for making a germ-line chimeric fish comprising:

providing a fish cell comprising a modifying polynucleotide integrated in a target polynucleotide;

introducing the fish cell to a recipient fish embryo to result in a chimeric fish embryo; and

incubating the chimeric fish embryo to produce a chimeric fish comprising a germ cell derived from the introduced fish cell.

12. The method of claim 11 wherein the fish cell is a zebrafish cell.

13. The method of claim 11 wherein the recipient fish embryo is a blastula-stage embryo or a gastrula-stage embryo.

14. The method of claim 11 wherein the fish cell is a zebrafish cell and the fish embryo is a zebrafish embryo.

15. A germ line chimeric fish obtained by the method of claim 11.

16. A method for making a fish heterozygous for a mutation comprising:

providing a first gamete obtained from a chimeric fish, wherein the first gamete comprises a modifying polynucleotide integrated in a target polynucleotide;

fertilizing the first gamete with a second gamete to result in a fertilized gamete, wherein the second gamete does not comprise the modifying polynucleotide integrated in the target polynucleotide; and

incubating the fertilized gamete to produce a fish heterozygous for the modifying polynucleotide integrated in the target polynucleotide.

17. The method of claim 16 wherein the first gamete and second gamete are obtained from zebrafish.

18. A heterozygous fish obtained by the method of claim 16.

19. A method for making a fish homozygous for a mutation comprising:

providing a first gamete obtained from a first fish, wherein the first gamete comprises a modifying polynucleotide integrated in a target polynucleotide;

providing a second gamete obtained from a second fish, wherein the second gamete comprises the same modifying polynucleotide integrated in the same target polynucleotide as the first gamete;

fertilizing the first gamete with the second gamete to result in a fertilized gamete; and

incubating the fertilized gamete to produce a fish homozygous for the modifying polynucleotide integrated in the target polynucleotide.

20. The method of claim 19 wherein the first gamete and second gamete are obtained from zebrafish.

21. A homozygous fish obtained by the method of claim 19.

22. A vector comprising a first homologous region, a second homologous region, and a first coding sequence encoding a selectable marker located between the first homologous region and second homologous region, wherein the first homologous region will undergo homologous recombination with a first region of a target polynucleotide present in a cell, and wherein the second homologous region will undergo homologous recombination with a second region of the target polynucleotide, the vector further comprising a second coding sequence encoding a detectable marker, the second coding sequence not located between the first homologous region and second homologous region.

23. The vector of claim 22 wherein the first coding sequence is operably linked to a regulatory sequence, the regulatory sequence comprising a promoter.

24. A method for integrating a polynucleotide comprising:

providing a cell comprising a target polynucleotide, wherein the cell will become a germ cell when introduced to an embryo;

introducing to the cell a modifying polynucleotide comprising a first homologous region, a second homologous region, and a first coding sequence encoding a selectable marker located between the first homologous region and second homologous region, wherein the first homologous region will undergo homologous recombination with a first region of a target polynucleotide present in the cell, and wherein the second homologous region will undergo homologous recombination with a second region of the target polynucleotide, the modifying polynucleotide further comprising a second coding sequence encoding a detectable marker, the second coding sequence not located between the first homologous region and second homologous region;

selecting for recipient cells expressing the selectable marker; and

identifying a recipient cell that does not express the detectable marker, wherein expression of the selectable marker and absence of expression of the detectable marker indicates the cell comprises the modifying polynucleotide integrated in the target polynucleotide.

25. The method of claim 24 wherein the cell is a fish cell or a mouse cell.

26. The method of claim 24 wherein the detectable marker is a fluorescent polypeptide.